

WHAT IS CLAIMED IS

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1. In a mobile communications system using a code division multiple access method, a call acceptance controlling apparatus for controlling acceptance of new calls and handover calls when a communication through a radio channel is performed between a mobile station in a cell and two or more radio base stations each forming a cell, the call acceptance controlling apparatus comprising:

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15 new call acceptance limiting means for restricting acceptance of a new call before any one of the following events takes place, namely,

an uplink interference amount in each radio channel from each mobile station that communicates with a radio base station to the radio base station reaching a predetermined maximum interference amount of the mobile communications system,

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25 a downlink total transmission power from the radio base station to mobile stations reaching a predetermined maximum power level of the mobile communications system, and

an amount of spread code resources available in the radio base station reaching null.

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2. The call acceptance controlling apparatus as claimed in claim 1, wherein the new call acceptance limiting means restricts acceptance of a new call before the uplink interference amount of a radio channel reaches the predetermined maximum

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interference amount of the mobile communications system, rejecting the new call to make the new call a lost call, when an uplink interference amount of any radio channel exceeds a first threshold value, comprising:

interference amount measuring means for measuring an interference amount of each uplink radio channel from a mobile station to a radio base station when there is a request for a new call, and

interference amount checking means for determining whether an interference amount of any radio channel measured by the interference amount measuring means is greater than the first threshold value that is defined as being smaller than the predetermined maximum interference amount of the mobile communications system.

3. The call acceptance controlling apparatus as claimed in claim 1, wherein the new call acceptance limiting means restricts acceptance of a new call before the uplink interference amount of a radio channel reaches the predetermined maximum interference amount of the mobile communications system, rejecting the new call to make the new call a lost call, when an uplink interference amount of any radio channel exceeds a second threshold value, comprising:

interference amount estimating means for estimating an interference amount of each uplink radio channel if a request for a new call is accepted, and

interference amount checking means for determining whether an interference amount of any radio channel estimated by the interference amount

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estimating means is greater than the second threshold value that is defined as being smaller than the predetermined maximum interference amount of the mobile communications system.

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4. The call acceptance controlling  
10 apparatus as claimed in claim 1, wherein the new  
call acceptance limiting means restricts acceptance  
of a new call before the downlink total transmission  
power reaches the predetermined maximum power level  
15 of the mobile communications system, rejecting the  
new call to make the new call a lost call, when the  
downlink total transmission power level exceeds a  
third threshold value, comprising:

total downlink transmission power  
measuring means for measuring a total transmission  
20 power of the radio base station, and

total downlink transmission power  
checking means for determining whether the total  
transmission power measured by the total downlink  
transmission power measuring means is greater than  
25 the third threshold value that is defined as being  
smaller than the predetermined maximum power level  
of the mobile communications system.

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5. The call acceptance controlling  
apparatus as claimed in claim 1, wherein the new  
call acceptance limiting means restricts acceptance  
35 of a new call before the downlink total transmission  
power reaches the predetermined maximum power level  
of the mobile communications system, rejecting the

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new call to make the new call a lost call, when the total downlink transmission power level exceeds a fourth threshold value, comprising:

- total downlink transmission power
- 5 estimating means for estimating a downlink total transmission power of the radio base station if a requested call is accepted, and
- total downlink transmission power
- checking means for determining whether the downlink
- 10 total transmission power estimated by the total downlink transmission power estimating means is greater than the fourth threshold value that is defined as being smaller than the predetermined maximum power level of the mobile communications
- 15 system.

- 20 6. The call acceptance controlling apparatus as claimed in claim 1, wherein the new call acceptance limiting means restricts acceptance of a new call before all the spread code resources of a radio base station is consumed, rejecting the
- 25 new call to make the new call a lost call, when an amount of the spread code resources available is less than a fifth threshold value, comprising:
- spread code resources measuring means for measuring an amount of the spread code resources
- 30 available in the radio base station, and
- spread code resources checking means for determining whether the amount of the spread code resources measured by the spread code resources measuring means is less than the fifth threshold
- 35 value.

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7. The call acceptance controlling apparatus as claimed in claim 2, further comprising  
5 first threshold adjustment means for increasing and decreasing the first threshold value, based on a lost call ratio of handover calls.

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8. The call acceptance controlling apparatus as claimed in claim 3, further comprising  
15 first threshold adjustment means for increasing and decreasing the second threshold value, based on a lost call ratio of handover calls.

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9. The call acceptance controlling apparatus as claimed in claim 4, further comprising  
25 first threshold adjustment means for increasing and decreasing the third threshold value, based on a lost call ratio of handover calls.

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10. The call acceptance controlling apparatus as claimed in claim 5, further comprising  
first threshold adjustment means for increasing and decreasing the fourth threshold value, based on a  
lost call ratio of handover calls.

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11. The call acceptance controlling apparatus as claimed in claim 6, further comprising first threshold adjustment means for increasing and  
5 decreasing the fifth threshold value, based on a lost call ratio of handover calls.

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12. The call acceptance controlling apparatus as claimed in claim 7, wherein the first threshold adjustment means decreases the first  
15 threshold value when the lost call ratio of the handover calls is greater than a first predetermined value, and increases the first threshold value when the lost call ratio of the handover calls is smaller than a second predetermined value that is defined as being smaller than the first predetermined value.

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13. The call acceptance controlling apparatus as claimed in claim 8, wherein the first  
25 threshold adjustment means decreases the second threshold value when the lost call ratio of the handover calls is greater than a first predetermined value, and increases the second threshold value when  
30 the lost call ratio of the handover calls is smaller than a second predetermined value that is defined as being smaller than the first predetermined value.

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14. The call acceptance controlling

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apparatus as claimed in claim 9, wherein the first threshold adjustment means decreases the third threshold value when the lost call ratio of the handover calls is greater than a third predetermined value, and increases the third threshold value when the lost call ratio of the handover calls is smaller than a fourth predetermined value that is defined as being smaller than the third predetermined value.

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15. The call acceptance controlling apparatus as claimed in claim 10, wherein the first threshold adjustment means decreases the fourth threshold value when the lost call ratio of the handover calls is greater than a third predetermined value, and increases the fourth threshold value when the lost call ratio of the handover calls is smaller than a fourth predetermined value that is defined as being smaller than the third predetermined value.

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16. The call acceptance controlling apparatus as claimed in claim 11, wherein the first threshold adjustment means increases the fifth threshold value when the lost call ratio of the handover calls is greater than a fifth predetermined value, and decreases the fifth threshold value when the lost call ratio of the handover calls is smaller than a sixth predetermined value that is defined as being smaller than the fifth predetermined value.

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17. The call acceptance controlling apparatus as claimed in claim 2, further comprising:

communication load measuring means for  
5 measuring a communication load of a radio base station which forms a cell adjacent to the cell formed by the radio base station concerned, and  
second threshold adjustment means for  
increasing and decreasing the first threshold value,  
10 based on the communication load measured by the communication load measuring means.

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18. The call acceptance controlling apparatus as claimed in claim 3, further comprising:

communication load measuring means for  
measuring a communication load of a radio base  
20 station which forms a cell adjacent to the cell formed by the radio base station concerned, and  
second threshold adjustment means for  
increasing and decreasing the second threshold value,  
based on the communication load measured by the  
25 communication load measuring means.

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19. The call acceptance controlling apparatus as claimed in claim 4, further comprising:

communication load measuring means for  
measuring a communication load of a radio base  
station which forms a cell adjacent to the cell  
35 formed by the radio base station concerned, and  
second threshold adjustment means for  
increasing and decreasing the third threshold value,

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based on the communication load measured by the communication load measuring means.

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20. The call acceptance controlling apparatus as claimed in claim 5, further comprising:

communication load measuring means for  
10 measuring a communication load of a radio base station which forms a cell adjacent to the cell formed by the radio base station concerned, and  
second threshold adjustment means for  
increasing and decreasing the fourth threshold value,  
15 based on the communication load measured by the communication load measuring means.

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21. The call acceptance controlling apparatus as claimed in claim 6, further comprising:

communication load measuring means for  
measuring a communication load of a radio base  
25 station which forms a cell adjacent to the cell formed by the radio base station concerned, and  
second threshold adjustment means for  
increasing and decreasing the fifth threshold value,  
based on the communication load measured by the  
30 communication load measuring means.

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22. The call acceptance controlling apparatus as claimed in claim 17, wherein the second threshold adjustment means decreases the first

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threshold value when the communication load measured  
by the communication load measuring means is greater  
than a seventh predetermined value, and increases  
the first threshold value when the communication  
5 load measured by the communication load measuring  
means is smaller than an eighth predetermined value  
that is defined as being smaller than the seventh  
predetermined value.

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23. The call acceptance controlling  
apparatus as claimed in claim 18, wherein the second  
15 threshold adjustment means decreases the second  
threshold value when the communication load measured  
by the communication load measuring means is greater  
than a seventh predetermined value, and increases  
the second threshold value when the communication  
20 load measured by the communication load measuring  
means is smaller than an eighth predetermined value  
that is defined as being smaller than the seventh  
predetermined value.

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24. The call acceptance controlling  
apparatus as claimed in claim 19, wherein the second  
30 threshold adjustment means decreases the third  
threshold value when the communication load measured  
by the communication load measuring means is greater  
than a ninth predetermined value, and increases the  
third threshold value when the communication load  
35 measured by the communication load measuring means  
is smaller than a tenth predetermined value that is  
defined as being smaller than the ninth

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predetermined value.

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25. The call acceptance controlling apparatus as claimed in claim 20, wherein the second threshold adjustment means decreases the fourth threshold value when the communication load measured by the communication load measuring means is greater than a ninth predetermined value, and increases the fourth threshold value when the communication load measured by the communication load measuring means is smaller than a tenth predetermined value that is defined as being smaller than the ninth predetermined value.

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26. The call acceptance controlling apparatus as claimed in claim 21, wherein the second threshold adjustment means increases the fifth threshold value when the communication load measured by the communication load measuring means is greater than an eleventh predetermined value, and decreases the fifth threshold value when the communication load measured by the communication load measuring means is smaller than a twelfth predetermined value that is defined as being smaller than the eleventh predetermined value.

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27. In a mobile communications system using a code division multiple access method, a call

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acceptance controlling method for controlling acceptance of new calls and handover calls, when a communication through a radio channel is performed between a mobile station in a cell and two or more

5 radio base stations each forming a cell, wherein acceptance of a new call is limited before any one of the following events takes place, namely,

an uplink interference amount in each radio channel from each mobile station that

10 communicates with a radio base station to the radio base station reaching a predetermined maximum interference amount of the mobile communications system,

a downlink total transmission power from

15 the radio base station to mobile stations reaching a predetermined maximum power level of the mobile communications system, and

an amount of spread code resources available in the radio base station reaching null.

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28. The call acceptance control method

25 as claimed in claim 27, wherein acceptance of a new call is limited before the uplink interference amount of a radio channel reaches the predetermined maximum interference amount of the mobile communications system, rejecting the new call to

30 make the new call a lost call, when an uplink interference amount of any radio channel exceeds a first threshold value, comprising:

an interference amount measuring step for measuring an interference amount of each uplink

35 radio channel from a mobile station to a radio base station when there is a request for a new call, and

an interference amount checking step for

determining whether an interference amount of any radio channel measured by the interference amount measuring step is greater than the first threshold value that is defined as being smaller than the predetermined maximum interference amount of the mobile communications system.

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29. The call acceptance control method as claimed in claim 27, wherein the acceptance of the new call is restricted before the uplink interference amount of the radio channel reaches the predetermined maximum interference amount of the mobile communications system, rejecting the new call to make the new call a lost call, when an uplink interference amount of any radio channel exceeds a second threshold value, comprising:

20 an interference amount estimating step for estimating an interference amount of each uplink radio channel if a request for a new call is accepted, and

25 an interference amount checking step for determining whether an interference amount of any radio channel estimated by the interference amount estimating step is greater than the second threshold value that is defined as being smaller than the predetermined maximum interference amount of the mobile communications system.

35 30. The call acceptance control method as claimed in claim 27, wherein the acceptance of the new call is restricted before the downlink total

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transmission power reaches the predetermined maximum power level of the mobile communications system, rejecting the new call to make the new call a lost call, when the downlink total transmission power level exceeds a third threshold value, comprising:

- 5 a total downlink transmission power measuring step for measuring a total transmission power of the radio base station, and
- 10 a total downlink transmission power checking step for determining whether the total transmission power measured by the total downlink transmission power measuring step is greater than the third threshold value that is defined as being smaller than the predetermined maximum power level
- 15 of the mobile communications system.

20 31. The call acceptance control method as claimed in claim 27, wherein the acceptance of the new call is restricted before the downlink total transmission power reaches the predetermined maximum power level of the mobile communications system, rejecting the new call to make the new call a lost call, when the total downlink transmission power level exceeds a fourth threshold value, comprising:

- 25 a total downlink transmission power estimating step for estimating a downlink total transmission power of the radio base station if a requested call is accepted, and
- 30 a total downlink transmission power checking step for determining whether the downlink total transmission power estimated by the total downlink transmission power estimating step is greater than the fourth threshold value that is defined as being smaller than the predetermined
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maximum power level of the mobile communications system.

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32. The call acceptance control method as claimed in claim 27, wherein the acceptance of the new call is restricted before all the spread code resources of a radio base station is consumed, rejecting the new call to make the new call a lost call, when an amount of the spread code resources available is less than a fifth threshold value, comprising:

15 a spread code resources measuring step for measuring an amount of the spread code resources available in the radio base station, and

a spread code resources checking step for determining whether the amount of the spread code resources measured by the spread code resources measuring step is less than the fifth threshold value.

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33. The call acceptance control method as claimed in claim 28, wherein the first threshold value is increased and decreased, based on a lost call ratio of handover calls.

34. The call acceptance control method as claimed in claim 29, wherein the second threshold value is increased and decreased, based on a lost

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call ratio of handover calls.

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35. The call acceptance control method as claimed in claim 30, wherein the third threshold value is increased and decreased, based on a lost call ratio of handover calls.

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36. The call acceptance control method as claimed in claim 31, wherein the fourth threshold value is increased and decreased, based on a lost call ratio of handover calls.

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37. The call acceptance control method as claimed in claim 32, wherein the fifth threshold value is increased and decreased, based on a lost call ratio of handover calls.

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38. The call acceptance control method as claimed in claim 33, wherein the first threshold value is decreased when the lost call ratio of the handover calls is greater than a first predetermined value, and the first threshold value is increased when the lost call ratio of the handover calls is smaller than a second predetermined value that is defined as being smaller than the first

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predetermined value.

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39. The call acceptance control method as claimed in claim 34, wherein the second threshold value is decreased when the lost call ratio of the handover calls is greater than a first predetermined value, and the second threshold value is increased when the lost call ratio of the handover calls is smaller than a second predetermined value that is defined as being smaller than the first predetermined value.

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40. The call acceptance control method as claimed in claim 35, wherein the third threshold value is decreased when the lost call ratio of the handover calls is greater than a third predetermined value, and the third threshold value is increased when the lost call ratio of the handover calls is smaller than a fourth predetermined value that is defined as being smaller than the third predetermined value.

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41. The call acceptance control method as claimed in claim 36, wherein the fourth threshold value is decreased when the lost call ratio of the handover calls is greater than a third predetermined value, and the fourth threshold value is increased when the lost call ratio of the handover calls is

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smaller than a fourth predetermined value that is defined as being smaller than the third predetermined value.

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42. The call acceptance control method as claimed in claim 37, wherein the fifth threshold value is increased when the lost call ratio of the handover calls is greater than a fifth predetermined value, and the fifth threshold value is decreased when the lost call ratio of the handover calls is smaller than a sixth predetermined value that is defined as being smaller than the fifth predetermined value.

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43. The call acceptance control method as claimed in claim 28, further comprising:

a communication load measuring step for measuring a communication load of a radio base station which forms a cell adjacent to the cell formed by the radio base station concerned, and

a threshold adjustment step for increasing and decreasing the first threshold value, based on the communication load measured by the communication load measuring step.

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44. The call acceptance control method as claimed in claim 29, further comprising:

a communication load measuring step for

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measuring a communication load of a radio base station which forms a cell adjacent to the cell formed by the radio base station concerned, and

- 5 a threshold adjustment step for increasing and decreasing the second threshold value, based on the communication load measured by the communication load measuring step.

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45. The call acceptance control method as claimed in claim 30 further comprising:

- 15 a communication load measuring step for measuring a communication load of a radio base station which forms a cell adjacent to the cell formed by the radio base station concerned, and  
20 a threshold adjustment step for increasing and decreasing the third threshold value, based on the communication load measured by the communication load measuring step.

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46. The call acceptance control method as claimed in claim 31, further comprising:

- 30 a communication load measuring step for measuring a communication load of a radio base station which forms a cell adjacent to the cell formed by the radio base station concerned, and  
35 a threshold adjustment step for increasing and decreasing the fourth threshold value, based on the communication load measured by the communication load measuring step.

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47. The call acceptance control method as claimed in claim 32, further comprising:

- 5 a communication load measuring step for measuring a communication load of a radio base station which forms a cell adjacent to the cell formed by the radio base station concerned, and
- 10 a threshold adjustment step for increasing and decreasing the fifth threshold value, based on the communication load measured by the communication load measuring step.

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48. The call acceptance control method as claimed in claim 43, wherein the first threshold value is decreased when the communication load
- 20 measured by the communication load measuring step is greater than a seventh predetermined value, and the first threshold value is increased when the communication load measured by the communication load measuring step is smaller than an eighth
- 25 predetermined value that is defined as being smaller than the seventh predetermined value.

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49. The call acceptance control method as claimed in claim 44, wherein the second threshold value is decreased when the communication load
- 35 measured by the communication load measuring step is greater than a seventh predetermined value, and the second threshold value is increased when the communication load measured by the communication

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load measuring step is smaller than an eighth predetermined value that is defined as being smaller than the seventh predetermined value.

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50. The call acceptance control method as claimed in claim 45, wherein the third threshold value is decreased when the communication load measured by the communication load measuring step is greater than a ninth predetermined value, and the third threshold value is increased when the communication load measured by the communication load measuring step is smaller than a tenth predetermined value that is defined as being smaller than the ninth predetermined value.

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51. The call acceptance control method as claimed in claim 46, wherein the fourth threshold value is decreased when the communication load measured by the communication load measuring step is greater than a ninth predetermined value, and the fourth threshold value is increased when the communication load measured by the communication load measuring step is smaller than a tenth predetermined value that is defined as being smaller than the ninth predetermined value.

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52. The call acceptance control method as claimed in claim 47, wherein the fifth threshold

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value is increased when the communication load measured by the communication load measuring step is greater than an eleventh predetermined value, and the fifth threshold value is decreased when the

5 communication load measured by the communication load measuring step is smaller than a twelfth predetermined value that is defined as being smaller than the eleventh predetermined value.

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